MEMORANDUM FOR: Hold for me
General Walters

Attached is the article (in Russian and English) concerning Soviet estimates of the resolution of our photo-satellites.

The reference to resolution is on page 2 of the English version. It gives the equivalent of about 6 to 18 feet, with "some sources, even to" about 1 foot.

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Ed Proctor

22 January 1973
(DATE)

FORM NO. 101 REPLACES FORM 10-101
1 AUG 54 WHICH MAY BE USED. (47)

Next 2 Page(s) In Document Exempt

"For Aggression, for Piracy - Global Means of Espionage of the Pentagon," by Yu. Yu'yev, Colonel-Engineer and L. Shevchuk, Major-Engineer and Candidate of Technical Sciences, Aviatsiya i Kosmonavtika, No. 5, 1972, pp. 46-47.

"American imperialism constantly confirms its aspiration to play the role of a unique guarantor and protector of an international system of exploitation and oppression. Everywhere it strives to rule over, to interfere in the affairs of other peoples, and to unceremoniously transgress their legal rights and sovereignty. By force, corruption and by economic penetration they try to impress their will on governments and entire regions of the world. Conclusive evidence of the militaristic tendencies of the ruling circles of the USA is the active reconnaissance, the particular attention to improvement of its form and methods, and the allocation of enormous funds for its needs. The goals of global espionage are graphically demonstrated in the Korean and IndoChinese wars and in the support of the aggressive course of Israel's militarists.

"For a long time artificial earth satellites have been an important means of global espionage of the Pentagon. They form a significant portion of the strategic reconnaissance forces of the American military command.

"Works connected with the development of cosmic means of reconnaissance were begun in the USA long before the orbiting of the first artificial earth satellite, and are being conducted on ever-increasing scales.

"Reconnaissance satellites of the US are being used to conduct photo-, radio, radio engineering, television, radar reconnaissance, for the detection of nuclear explosions, and for the detection of launches of ballistic rockets from land-based installations and submarines. Reconnaissance satellites are controlled by the Control Center located in Sunnyvale (state of California) that directs the command-measuring complex that includes ground-based stations located in the territory of the US and beyond its borders.

"To obtain the data of interest to the Pentagon, use is made of survey and high-detail/search and spotting or low and high resolution/photoreconnaissance satellites placed in low, near-polar orbits with a perigee of 120-200 km. With them regular observations are conducted of rocket launch positions, airdromes, troop movements and, in particular, tank forces.

"Search-type satellites which are equipped with photo apparatus with wide-angle lenses, are intended for photographing large areas with relatively low resolution. Such a method makes it possible to conduct continuous photography of territories of interest. From the photographs the most important objects are defined and then high-resolution photoreconnaissance is used for further investigation of the objects.

"At the present time in the US use is being made in photoreconnaissance of satellites developed in the 'Discoverer' (figure 1) and '770' programs. Their typical orbit is elliptical with a perigee of 160-200 km, an apogee of 450 km and an inclination of 75-90°. As a rule, the time spent in orbit does not exceed 3-4 weeks. The film exposed while in orbit is ejected from the satellites to the earth in containers that are recovered in the air by aircraft. To facilitate location the containers are equipped with radio beacons and devices to color the water at the landing location.

"According to published information, in the latest versions of satellites developed in 'Program 770' equipment for radio-technical/Elint/ and radar/radint/reconnaissance is installed in addition to the photographic equipment. Signals from communication and radar stations are recorded on magnetic tape that is ejected in a container together with the exposed photographic film. The radar equipment makes it possible to conduct reconnaissance under any meteorological condition and to detect objects concealed by foliage and even those located several centimeters below the surface of the earth.

"High-resolution photoreconnaissance satellites were intended for large-scale photographing of individual objects detected during analysis of low-resolution materials. A characteristic feature of these satellites is their low perigee (130-145 km).

"Together with the long focal length lenses the low perigees make it possible to obtain photographs with a resolution of 1.8-5.5 m (according to some sources, even to 0.3 m).

"In the period 1962-64 there were 12-14 low-resolution satellites orbited each year. Beginning in 1965 the number of satellites of this type orbited decreased to 8-9. Also, the photography was conducted without overlapping since the maps had obviously been already compiled and it was only necessary to refine them.

"The total time that the photoreconnaissance satellites spent in orbit was about 180 days a year. The number of high-resolution satellites orbited has reached 8-9 per year. The one exception was 1966 when 15 high-resolution satellites were launched.

"The next step in cosmic reconnaissance systems was the development of satellites in the '647' program. These are multipurpose satellites that are intended for simultaneous solution of such problems as detecting launches of intercontinental ballistic missiles, the conduct of photographic and radio-technical/Elint/reconnaissance, the recording of troop movements and observation of military objects, the determination of the coordinates of nuclear explosions and the monitoring of nuclear strikes, and the conduct of strategic meteorological reconnaissance. The weight of such a satellite is about 800 kg, the length 7 m and the diameter 3 m. The launches began in 1970.

"The launches of satellites in the '647' program into synchronous orbits makes it possible to observe not only regions in the equatorial and mean latitudes, but also to monitor the near-polar regions of the North and South Poles. Information from orbit is transmitted on radio channels to ground stations. In addition, the exposed film and magnetic tape can be returned to the earth in containers.

"While acknowledging the advantage of the satellites as means for strategic reconnaissance, American specialists also point out their shortcomings. One of the basic deficiencies of photoreconnaissance satellites, in their opinion, is that they do not make it possible to obtain information in real time. Even in the best case from the moment of photographing to the beginning of film developing several tens of hours pass, whereas in this time the situation could change considerably. Also, in low-resolution reconnaissance many photographs are obtained that are of no interest.

"Several years ago attempts to install television equipment on reconnaissance satellites ended in failure due mainly to its poor resolution (compared to photo equipment) and difficulties in transmitting television images to the earth. However, since the first experiments the television equipment has been improved considerably. Transmitting tubes have appeared that permit a resolution approaching that of photographs. They are now being used in the search-type satellites.

"The Pentagon also assigns high significance to means for radio-technical/Elint/reconnaissance from space. Special satellites are being used to determine the characteristics and location of ground-based radar and communications stations and to intercept radio signals that ground-based radio-intercept means can detect only along their line-of-sight. One of the most widely used American means of radio-technical reconnaissance are the 'Ferret' satellites. They weigh over one ton, are 6.7 m long, 1.5 m in diameter and are intended for radio-technical/Elint/ and radio/Comint/reconnaissance, particularly for intercepting conversations from ships and submarines at sea, and even conversations of (military) staff members with various subordinate divisions. According to certain information the satellite can be used to receive information from low-power transmitters, i.e., transmitters used by undercover agents. The received information is recorded on board and transmitted to the earth when the satellite passes over tracking stations. The typical orbit of 'Ferret' satellites is almost circular--with an altitude of about 500 km and an inclination of 75-82°.

"Approximately the same tasks are being carried out by radio-technical satellites of the 'P-11' type (figure 2), which weigh 60-160 kg and have a maximum dimension of 0.9 m. These satellites are placed in orbit together with photoreconnaissance satellites as an auxilliary/'piggyback'/ payload. (ed.)

"To increase the capability and accuracy of collecting information by radio-technical means, the Lockheed firm on contract with the USAF is developing a new photo- and radio-technical reconnaissance 'Sigint' (SIDEHINT) satellite which is to replace not only the 'Ferret' and 'P-11' satellites, but also the reconnaissance aircraft and vessels that constantly fly and sail along the borders of the Soviet Union. The satellite is equipped with a three-axis system of orientation, a high-precision stabilization system, a power source using solar elements and chemical batteries and also equipment for generating interference (jamming). The (ed.)

satellite weighs over 10 tons. It is placed in circular polar orbits with an altitude of about 185 km to conduct reconnaissance above foreign territories.

"The 'Sigint' orbit must pass twice a day over the airbase at Buckley (state of Colorado) where special equipment has been installed to receive information from the satellite.

"Since 1963 the USA has been launching satellites for detecting nuclear explosions on the surface of the earth, in the atmosphere and in distant space. On board such satellites are installed detectors of X-ray and gamma radiation, neutron fluxes, the change of phonon radiation and also an electron-proton spectrometer. With this equipment are recorded radiation and flows of particles that appear not only during nuclear explosions of artificial origin, but also during increases in solar activity. The information obtained from the satellites is used in training and in flights of the Apollo spacecraft to ensure safety of the astronauts.

"A special feature of the method used to monitor nuclear explosions and solar flares is the paired launch of satellites into orbits with an altitude of 90-110 thousand kilometers. According to published information, in the make-up of the system that is now in operation there are 12 satellites that permit around-the-clock observation of the entire surface of the earth and of near-earth space.

"Despite such diversified means of space reconnaissance the efforts of the USA are not limited to specialized satellite systems. The military-industrial circles of the USA pose the question of the possibility of using space complexes of any designation for military purposes.

"For example, in the flights of the piloted Gemini spacecraft a study was made of means for detecting ICBMs. Using special equipment the Gemini crew made repeated fixes of ballistic rocket launches from ranges and recorded infrared radiation from the plumes of rockets in flight and on special test stands. In photographing the surface of the earth the Apollo spacecraft used film with the same super sensitivity as the film in reconnaissance satellites. It is not mere chance that the US Department of Defense and the Atomic Energy Commission prohibited publication of a large number of photographs. There appeared in the press information to the effect that specialists of the US Department of Defense regularly examine photographs taken by NASA 'Tiros' and 'Nimbus' meteorological satellites.

"Military circles in the USA have also manifested great interest in satellites intended for experiments on the compilation of soil utilization maps of the USA, geological-soil maps, agricultural maps, on the collection of data from observation points concerning the continental shelf, bays, estuaries of rivers and other regions where observations are being conducted on tides, shorelines, and regions hazardous to shipping. These satellites will be equipped with color television cameras with a

resolution of 60 m when photographing from a polar orbit with an altitude of about 900 km and recording on video film. In the case of transmitting information in real time the resolution of this equipment should increase twofold. Therefore the Pentagon is interested in these satellites also.

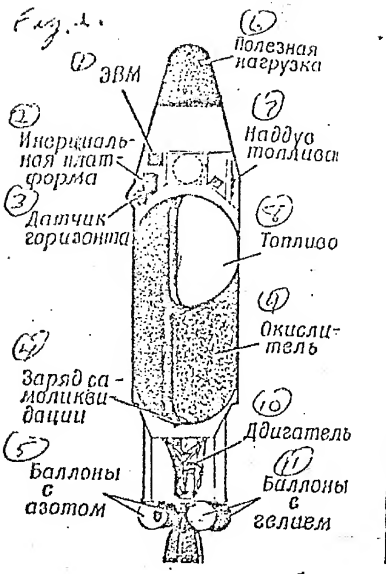
"Another object that interests the US military command is the 'Skylab' orbital station being developed under the supervision of NASA. Its launch is intended in 1973 for the purpose of conducting scientific-technical and medical-biological experiments and also several experiments in a Department of Defense program.

"To service orbital stations of any type and also to solve independent military problems of the USAF, it is proposed to develop multi-purpose transport craft for shuttle flights along the earth-orbit-earth route. Such a craft will be able to maneuver in space, solving a wide range of military tasks (reconnaissance, inspection and, if necessary, destruction in orbit of space objects of a potential adversary, repair of space objects either in orbit or returning them to earth for repair, and others.)

"According to plans of the Americans the Air Force should use spacecraft for the launch of reconnaissance satellites and other equipment of military designation, return to the earth capsules of exposed film, inspect enemy satellites, and perform military assignments having a total duration of up to two days.

"The above enumerated works do not encompass the entire circle of interests of the US military-industrial complex pertaining to the development of space reconnaissance systems. The reconnaissance systems of the USA are constantly developing in the direction of increased effectiveness and operation capability for the purpose of ensuring military supremacy over the countries of the socialist camp.

"But let the Pentagon leaders not fool themselves with their vain illusions. 'We have everything we need,' said Comrade L.I. Brezhnev at the 24th Congress of the CPSU, 'we have the straightforward policy of peace, the military might, and the solidarity of the Soviet people to ensure the freedom of our borders from any encroachment, and to protect the conquest of socialism.' At the same time the fighting men of the Soviet Armed Forces should never forget the global espionage of the American imperialists, and they should manifest high vigilance and solidarity."



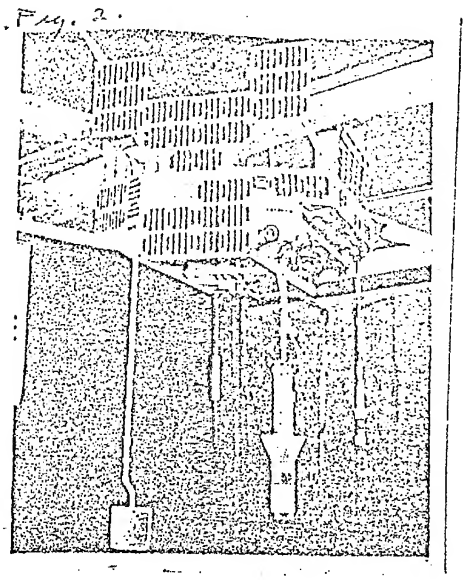


Figure 1. The Discover low-resolution reconnaissance satellite

1. computer
2. inertial platform
3. horizon sensor
4. destruct charge
5. nitrogen bottles
6. payload
7. fuel pressurization
8. fuel
9. oxidizer
10. engine
11. helium bottles

Figure 2. "R-1" satellite for radio-technical reconnaissance.